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REMARKS

Claims 1-24 are pending in the application with Claims 1-17 under consideration. Claims 1 and 15 are independent.

The specification was objected to because of a typographical error. The error has been corrected and withdrawal of the objection is accordingly respectfully requested.

Claims 1-4 were rejected under 35 USC 103(a) as being unpatentable over Naitoh et al. (US 4,888,666) in view of Crawford et al. (US 4,364,995). Claim 5 was rejected as being unpatentable over Naitoh and Crawford in view of MacFarlane et al. (US 4,942,501). Claims 6-14 were rejected as being unpatentable over Naitoh, Crawford and MacFarlane in view of Harrington et al. (US 6,475,368). Claims 15-17 were rejected as being unpatentable over Naitoh and Crawford in view of Harrington. Claim 17 was further rejected as being unpatentable over Naitoh, Crawford and MacFarlane in view of Harrington. In view of the following discussion, each rejection is respectfully traversed and reconsideration is requested.

Claims 1-14

Independent Claim 1 is directed to a method for preparing an anodized electrode including the sequential steps of: (1) providing a substrate; (2) coating the surface of the substrate by vacuum deposition thereon of a porous coating comprising at least one substance selected from valve metals, valve metal oxides and mixtures thereof; (3) increasing the effective surface area of porous coating; and (4) producing electrolytically at least one anodized valve oxide layer overlaying the surface of said porous coating.

Again, in the Official Action, Claims 1-4 were rejected as unpatentable under 35 USC 103(a) over Naitoh in view of Crawford.

Applicant submits that Naitoh relates to a roll type solid electrolytic capacitor comprising a capacitor element in the form of a roll which consists of a valve metal positive electrode substrate having a dielectric oxide layer on both of the entire surfaces thereof, a semiconductor layer (such as lead oxide \pm lead sulfate) formed on the entire surface of each dielectric oxide layer and an electroconductive layer, formed on the entire surface of each semiconductor layer, from at least one electroconductive paste selected from a silver paste, a copper paste, a nickel paste, an aluminum paste and a carbon paste (see e.g., Claim 1 of Naitoh).

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Crawford is introduced into the 35 USC 103(a) rejection because it allegedly discloses vacuum deposition of inter alia, aluminum/aluminum oxide on an aluminum surface.

Applicants submit that the invention defined by independent Claim 1 (and of dependent Claims 2-14) is not made obvious by Naitoh and the other references cited in the Official Action, for a number of reasons:

(1) Of the valve metal substrate/ dielectric oxide/ semiconductor/ electro-conductive paste layered construct disclosed in Naitoh, only the first two layers, i.e. substrate/ dielectric oxide, can be related to the present claimed invention, which is concerned neither with a semiconductor layer such as lead oxide \pm lead sulfate, nor with an electroconductive paste layer.

(2) The combination of Naitoh and Crawford would not be an obvious combination to a person of the art. This is because Naitoh teaches anodization (e.g. in Example 25) as a preferred method of forming the required dielectric layer on the valve metal substrate, whereas Crawford (col. 1, lines 34-36) teaches *away from* anodization on the grounds of high energy costs and time-consuming steps.

Even supposing that a person of the art would make the combination, however, this might merely suggest no more than a valve metal substrate/ vacuum deposited dielectric oxide/ semiconductor/ electro-conductive paste layered construct, which still would not make the invention of claims 1-14 obvious.

(3) Neither Naitoh nor Crawford, whether alone or combined, disclose any operation for increasing the effective surface area of the porous coating. The Official Action cites col. 3 lines 12-35 of Naitoh to support the supposition that winding the substrate into a roll "would increase the surface area of the coating by way of stretching and surface deformation due to the applied force thereby forming a porous layer". This supposition is however not supported by the cited passage, but is mere speculation. Naitoh neither discloses that stretching and surface deformation results from the winding operation of the composite including the valve metal substrate, nor does it have anything to say on the subject of effective surface area of the coating, still less its increase, as is required by the present invention. During the winding, the dielectric layer may crack (col. 3, lines 36-37), but this has no bearing on increasing the effective surface area.

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(4) Since neither Naitoh nor Crawford, whether alone or combined, disclose any operation for increasing the effective surface area of the porous coating, as shown in paragraph (3), above, it follows that the obviousness rejection also does not address part (4) of present independent Claim 1, which requires producing electrolytically at least one anodized valve oxide layer overlaying the surface of the (increased effective surface area) porous coating.

(5) In relation to dependent Claim 2, it is stated in the Official Action that Naitoh discloses the use of an oxidant such as potassium permanganate to prepare an anodized electrode and to increase pore volume because of its etching capabilities. In this connection, it is however pointed out that the present invention requires producing electrolytically an anodized valve oxide layer, whereas the context in which oxidants such as potassium permanganate are mentioned, is chemical deposition of lead oxide (Naitoh, at col. 4, lines 5-8 and 38-40). Moreover, Naitoh does not suggest use of these oxidants to increase pore volume.

(6) As regards the remarks in the Official Action concerning dependent Claims 3-4, it is agreed that the feature that the substrate is electrically conductive, e.g. aluminum foil, is not novel per se, but it is submitted that this fact does not adversely affect the patentability of the invention as a whole.

(7) In the Official Action, dependent Claim 5 was rejected under 35 USC 103(a) as being unpatentable over Naitoh with evidence from Crawford, in view of Macfarlane. Applicants respectfully disagree with the views in the Official Action regarding Claim 5, for at least the following reasons:

(a) as pointed out in paragraph (5) above, Naitoh does not disclose preparation of an electrolytically anodized electrode, which is not constituted by the disclosed lead oxide layer;

(b) while MacFarlane may disclose an annealed aluminum foil (substrate), it does not disclose or suggest annealing an anodized layer, nor does it disclose successive anodized layers, still less annealing before the last of successive anodization steps recited in Claim 5;

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(c) while MacFarlane may disclose that deep etching of an aluminum foil substrate "maximizes" surface area, this does not suggest the element of the presently claimed method of Claim 5, in which a substrate is coated with a vapor-deposited porous layer and the pores thereof are enlarged;

(8) In the Official Action, dependent Claims 6-7 and 11 were rejected under 35 USC 103(a) as being unpatentable over Naitoh, in view of MacFarlane and in further view of Harrington. However, Applicants respectfully disagree with this rejection, because it does not overcome the flaw in the Naitoh and MacFarlane rejection that none of the cited art suggests vacuum depositing a porous layer, then enlarging the pores thereof and subsequently anodizing the whole product. Harrington is concerned only with a particular method of anodizing an aluminum substrate, not a porous layered and pore-enlarged substrate as in the present case, and thus does not add anything substantive to the previously stated 35 USC 103(a) rejections.

(9) In the Official Action, Claims 8 and 12 were in effect rejected under 35 USC 103(a) as being unpatentable over Naitoh, in view of MacFarlane and in further view of Harrington. However, Applicants have already given reasons above (see paragraph 7(b)), why this combination of references does not make obvious, annealing before the last of successive anodization steps.

(10) In the Official Action, Claims 9-10 and 13-14 were in effect rejected under 35 USC 103(a) as being unpatentable over Naitoh, because of the disclosure therein of chromic acid. However, Applicants respectfully disagree with this rejection, not only because Naitoh does not suggest enlargement of the pores in a porous layer and subsequent electrolytic anodization, but also because the context in which oxidants such as chromic acid are mentioned, is chemical deposition of lead oxide (Naitoh, at col. 4, lines 5-8 and 38-40).

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Claims 15-17

Claim 15 relates to a method for preparing an anodized electrode which includes pores having a branched morphology, including the sequential steps of: (1) providing a metallic foil substrate; (2) coating the surface of the substrate by vacuum deposition thereon of aluminum vapor in presence of a minor amount of oxygen such that a porous layer, consisting essentially of an aluminum metal component and an aluminum oxide component, is deposited on said substrate; (3) increasing the effective surface area of said porous coating by electrolytic anodization in presence of an electrolyte which comprises a saturated dicarboxylic acid salt selected from the ammonium and alkali metal salts, and removing thus-formed valve metal oxide(s), as well as at least part of said aluminum oxide component, by use of a halogen-free chemical etchant *in situ* or in a discrete subsequent sub-step; and (4) producing electrolytically at least one anodized aluminum oxide layer overlaying the surface of said porous coating.

In the Official Action, Claims 15-17 were rejected under 35 USC 103(a) as being unpatentable over Naitoh, in view of Crawford and Harrington. However, Applicants respectfully disagree with this rejection, for the following reasons which apply especially to the detailed rejection of independent Claim 15 on page 6, line 9 to page 8, line 2 of the Official Action:

- (A) contrary to page 6, line 10, Naitoh *does not* suggest final stage electrolytic anodization, as required by present independent Claim 15;
- (B) contrary to page 6, lines 11-12, coating the substrate with aluminum oxide would *not* give the porous layer required by Claim 15, part (2);
- (C) contrary to page 6, lines 13-15, neither at col. 3, lines 12-35 of Naitoh, nor anywhere else therein, is it stated that winding the substrate gives rise to a porous layer, rather it is stated that during the winding, the dielectric layer may crack (col. 3, lines 36-37), but cracking teaches away from any notion of forming a porous layer;
- (D) contrary to the implication at page 6, lines 15-18 of the Official Action, formation of a lead dioxide layer bears no relation to the invention of Claim 15;
- (E) contrary to the implication at page 6, lines 18-21 of the Official Action, formation of paste layer bears no relation to the invention defined by Claim 15;

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(F) contrary to page 7, lines 2-7, the combination of Naitoh and Crawford would *not* be an obvious combination to a person of the art, because Naitoh teaches anodization (e.g. in Example 25) as a preferred method of forming the required dielectric layer on the valve metal substrate, whereas Crawford (col. 1, lines 34-36) teaches away from anodization on the grounds of high energy costs and time-consuming steps;

(G) contrary to the implication at page 7, lines 2-7, vacuum deposition of aluminum oxide would *not* give the layer defined in part (2) of Claim 15;

(H) contrary to the implication in the third paragraph on page 7, the organic acid mentioned as an example of electrolyte in the description of prior art electrolytic capacitors in col. 1 of Naitoh has no relation to the oxidation reaction to produce lead dioxide in col. 6 of Naitoh, line 42 et seq.;

(I) contrary to the implication in the last two paragraphs on page 7, the disclosure of dibasic salts in Harrington does not suggest that such salts would be a useful adjunct in the pore enlargement step of Claim 15, part (3);

(J) In the Official Action (page 8, lines 3-4), dependent Claim 16 was in effect rejected under 35 USC 103(a) as being unpatentable over Naitoh, because of the disclosure therein of chromic acid, whereas as pointed out above, the context in which oxidants such as chromic acid are mentioned, is chemical deposition of lead oxide (Naitoh, at col. 4, lines 5-8 and 38-40).

(K) In the Official Action, Claim 17 was rejected under 35 USC 103(a) as being unpatentable over Naitoh in view of Crawford and Harrington and in further view of MacFarlane. However, while MacFarlane discloses an annealed aluminum foil (substrate), it does *not* disclose or suggest annealing an anodized layer, nor does it disclose successive anodized layers, still less annealing before the last of successive anodization steps as in present Claim 17.

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(L) Moreover, contrary to page 8, lines 11-16 of the Official Action, the cited passage in McFarlane mentions (col. 5, line 18) only annealing and etching an aluminum foil (substrate), not a coated aluminum foil. Also, the fact that this annealing and deep etching of an aluminum foil substrate "maximizes" surface area does not suggest the presently claimed method, in which a substrate is coated with a vapor-deposited porous layer and the pores thereof are enlarged.

(M) For reasons given in paragraphs (K) and (L), above, it is submitted that the Examiner's conclusion as to the alleged obviousness of Claim 17 is not supported by the disclosures in the cited references.

SUMMARY OF MAIN REASONS FOR THE INCORRECTNESS
OF THE 35 USC 103(a) REJECTIONS

(1) An essential feature of independent method Claims 1 and 15, and thus of all of pending Claims 1-17, for preparing an anodized electrode, is that (in steps 2 and 3) the surface of a substrate is coated by vacuum deposition thereon of a porous coating of defined composition, then the effective surface area of the porous coating is increased, e.g. by increasing the total pore volume or increasing the average pore width. None of the cited references, however combined, suggest increasing the effective surface area of such a vacuum deposited coating.

The Official Action cites col. 3 lines 12-35 of Naitoh to support the idea that winding the valve metal substrate into a roll "would increase the surface area of the coating by way of stretching and surface deformation due to the applied force thereby forming a porous layer". This proposition is however merely speculative, and finds no support in the cited passage. Naitoh says nothing on the subject of effective surface area of the coating, still less its increase, as is required by the present invention. During the winding, the dielectric layer may crack (Naitoh, col. 3, lines 36-37), but this has no bearing on increasing the effective surface area.

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(2) A further essential feature of independent method Claims 1 and 15, and thus of all pending Claims 1-17, is that (in step 4) there is produced electrolytically at least one anodized valve oxide layer overlaying the surface of said porous coating. While it is repeatedly asserted in the Official Action that Naitoh discloses an anodized electrode (presumably having an anodized valve oxide layer produced electrolytically), this assertion is not supported in the document itself. In Naitoh, the deposited lead dioxide layer is neither an anodized layer, nor is it a valve oxide layer as required by the present claims. The fact that one of the alternate methods for depositing lead dioxide described in Naitoh is an electrolytic method, does not mean that the lead dioxide layer is an anodized layer, and of course it is certainly not a valve oxide layer.

(3) In more detail, independent Claim 15 relates to a method for preparing an anodized electrode which includes pores having a branched morphology. The Official Action does not relate at all to this specific product of the claimed method.

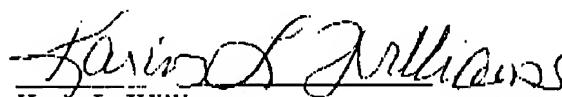
(4) The 35 USC 103(a) rejections all depend on Naitoh, with either evidence from, or in combination with, other specified references. However, Naitoh relates to a roll-type solid electrolytic capacitor, in which a semiconductor layer (such as lead oxide \pm lead sulfate) is formed on the entire surface of each dielectric oxide layer and an electroconductive layer, is formed on the entire surface of each semiconductor layer, the electroconductive layer being formed from at least one electroconductive paste selected from a silver paste, a copper paste, a nickel paste, an aluminum paste and a carbon paste. It is difficult to see how these rejections can be reasonably maintained, given that the product of the presently claimed method utilizes neither the semiconductor layer as described in Naitoh, nor Naitoh's electroconductive paste.

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CONCLUSION

It is believed that sufficient reasons have been given above for withdrawal of the 35 USC 103(a) rejections. Should the Examiner be of the view that an interview would expedite consideration of the application, or if the proposed amendment raises any issues that may be resolved by a telephone discussion, request is respectfully made that the Examiner telephone the Applicant's attorney at (908) 518-7700 in order that any outstanding issues be resolved.

Respectfully submitted,


Karin L. Williams
Registration No. 36,721

Please Continue To Send All Correspondence to:

Mayer, Fortkort & Williams PC
251 North Avenue West; 2nd Floor
Westfield, NJ 07090

Telephone #: 908-518-7700
Fax #: 908-518-7795